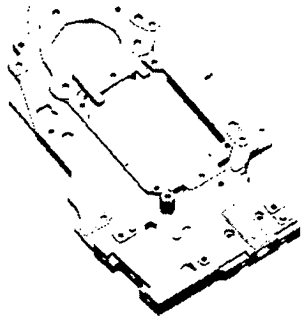


FIG. 1A

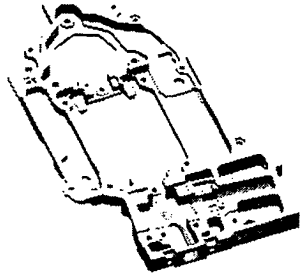


FIG. 1B

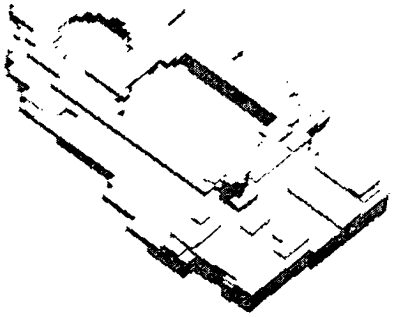


FIG. 1C

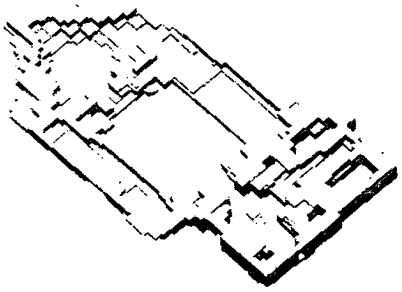


FIG. 1D

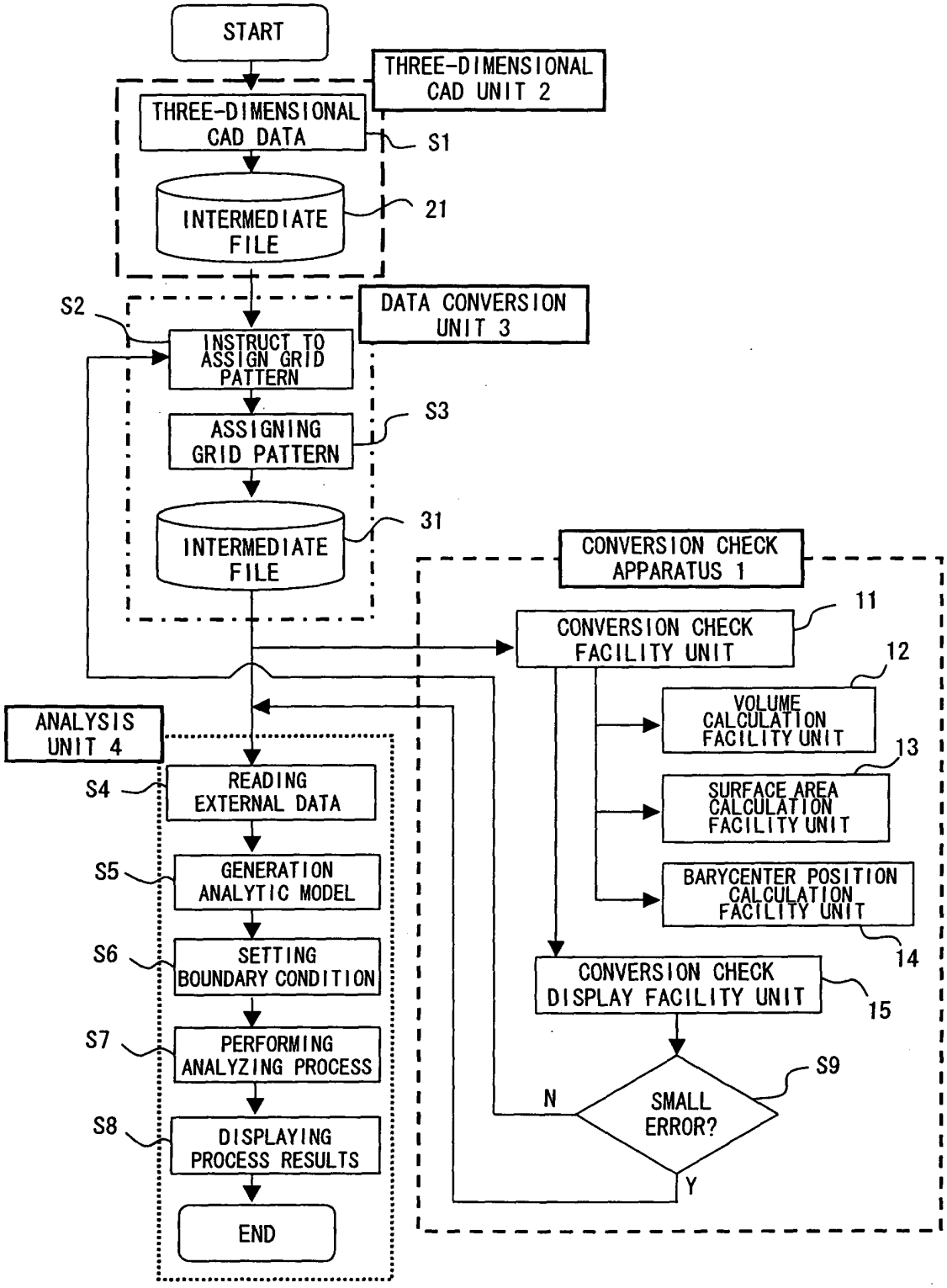

START
THREE-DIMENSIONAL CAD UNIT 2
THREE-DIMENSIONAL CAD DATA
S1
INTERMEDIATE FILE
21
DATA CONVERSION UNIT 3
S2
INSTRUCT TO ASSIGN GRID PATTERN
ASSIGNING GRID PATTERN
S3
INTERMEDIATE FILE
31
CONVERSION CHECK APPARATUS 1
CONVERSION CHECK FACILITY UNIT
11
VOLUME CALCULATION FACILITY UNIT
12
SURFACE AREA CALCULATION FACILITY UNIT
13
BARYCENTER POSITION CALCULATION FACILITY UNIT
14
CONVERSION CHECK DISPLAY FACILITY UNIT
15
SMALL ERROR?
S9
N
Y
ANALYSIS UNIT 4
READING EXTERNAL DATA
S4
GENERATION ANALYTIC MODEL
S5
SETTING BOUNDARY CONDITION
S6
PERFORMING ANALYZING PROCESS
S7
DISPLAYING PROCESS RESULTS
S8
END

FIG. 2

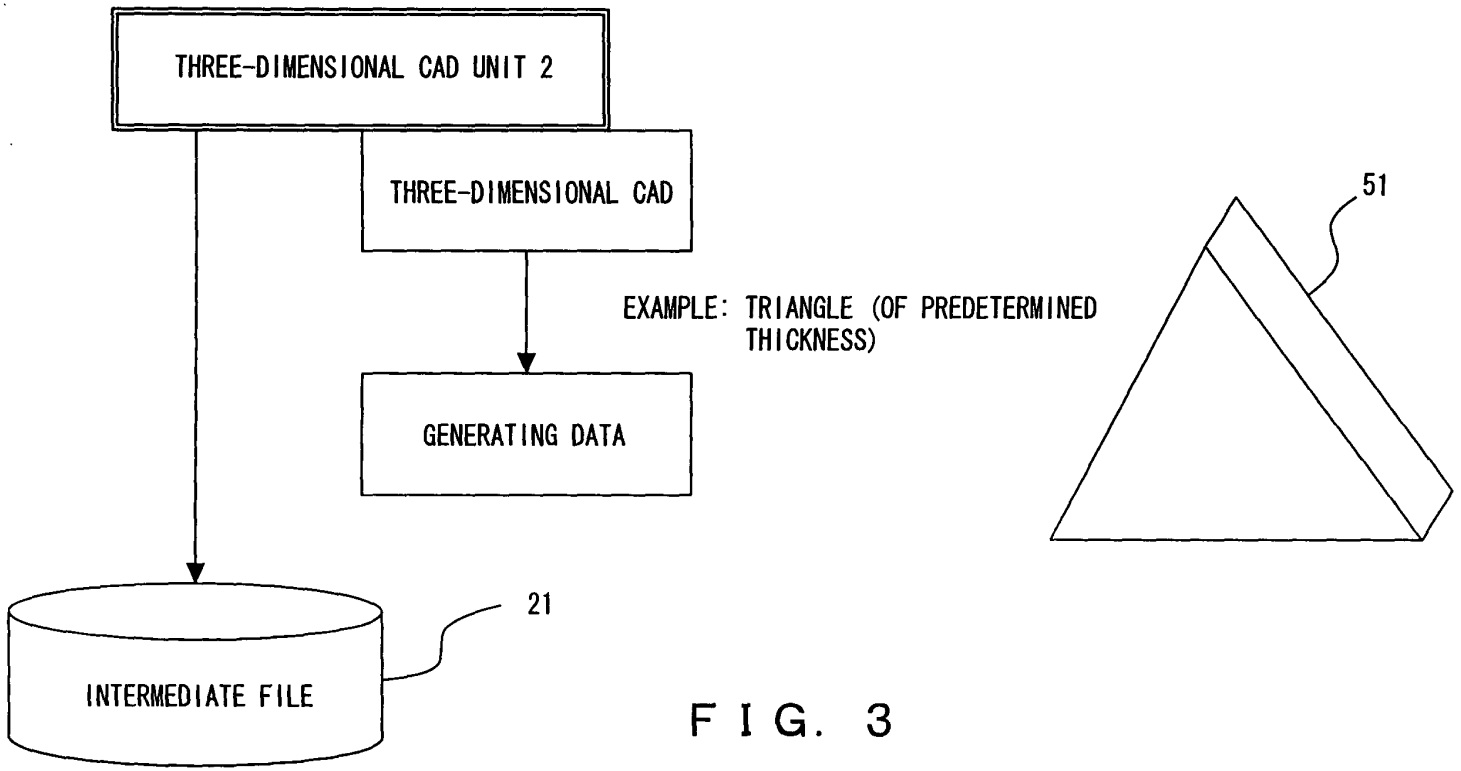

THREE-DIMENSIONAL CAD UNIT 2
THREE-DIMENSIONAL CAD
GENERATING DATA
INTERMEDIATE FILE
21
EXAMPLE: TRIANGLE (OF PREDETERMINED THICKNESS)
51

FIG. 3

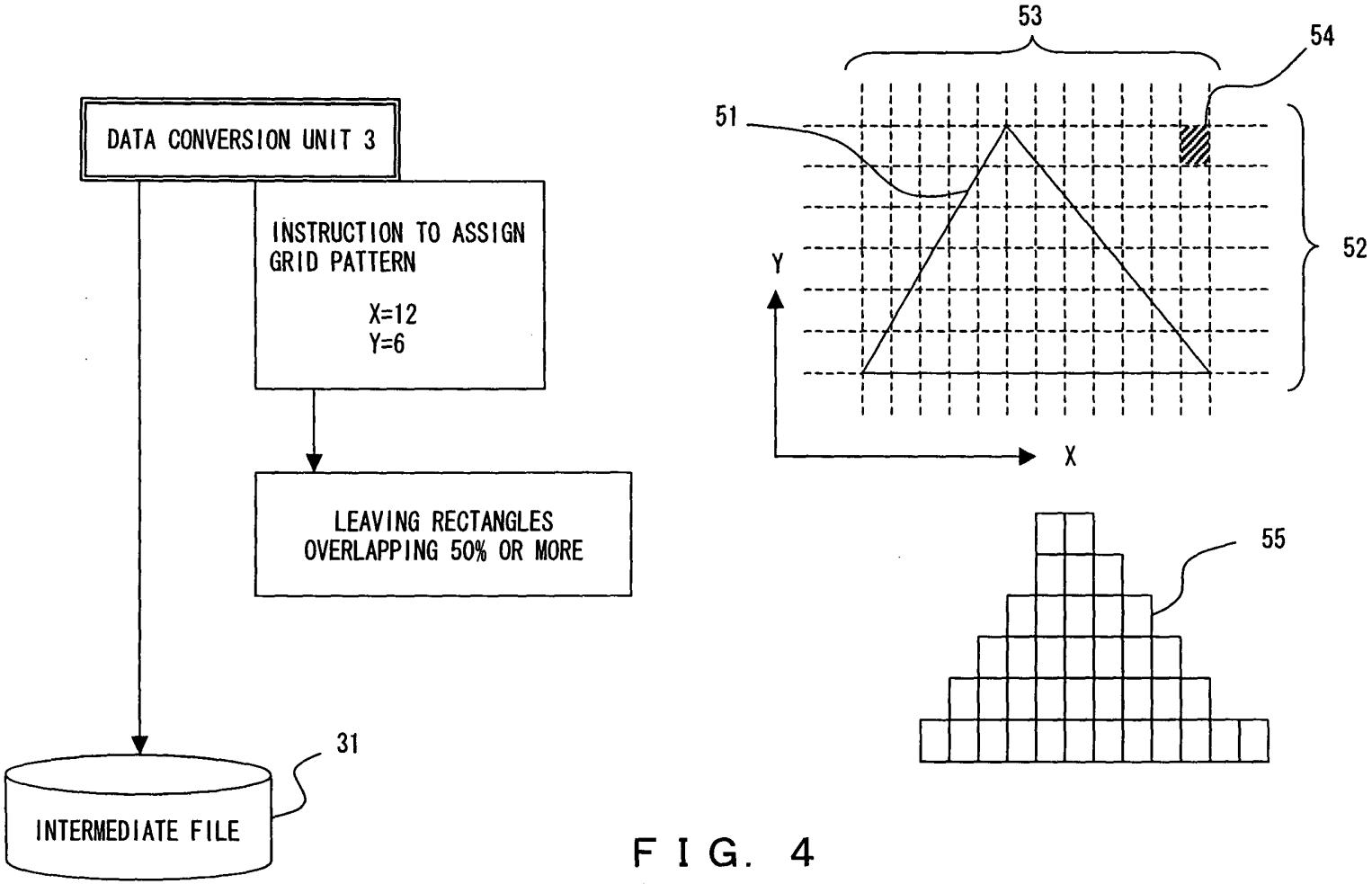

DATA CONVERSION UNIT 3
INSTRUCTION TO ASSIGN GRID PATTERN
X=12
Y=6
LEAVING RECTANGLES OVERLAPPING 50% OR MORE
INTERMEDIATE FILE
31
53
54
51
52
Y
X
55

FIG. 4

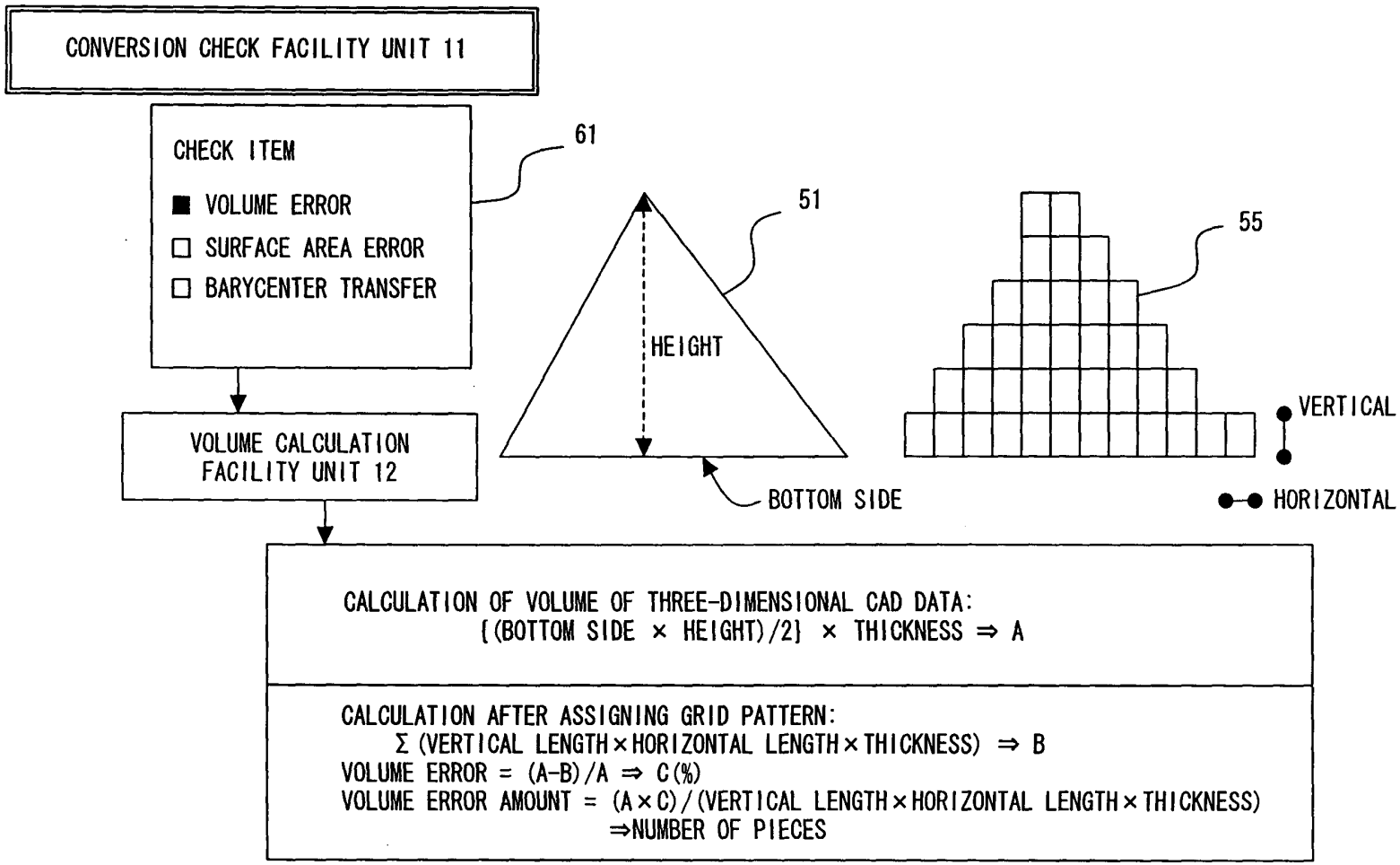

CONVERSION CHECK FACILITY UNIT 11
CHECK ITEM
■ VOLUME ERROR
□ SURFACE AREA ERROR
□ BARYCENTER TRANSFER
61
VOLUME CALCULATION FACILITY UNIT 12
51
HEIGHT
BOTTOM SIDE
55
VERTICAL
HORIZONTAL
CALCULATION OF VOLUME OF THREE-DIMENSIONAL CAD DATA:
{(BOTTOM SIDE × HEIGHT)/2} × THICKNESS ⇒ A
CALCULATION AFTER ASSIGNING GRID PATTERN:
Σ (VERTICAL LENGTH×HORIZONTAL LENGTH×THICKNESS) ⇒ B
VOLUME ERROR = (A-B)/A ⇒ C(%)
VOLUME ERROR AMOUNT = (A×C)/(VERTICAL LENGTH×HORIZONTAL LENGTH×THICKNESS)
⇒NUMBER OF PIECES

FIG. 5

DATA STRUCTURE AFTER ASSIGNING GRID PATTERN (EXAMPLE)

	COORDINATE NUMBER 1			・・・	COORDINATE NUMBER 8		
RECTANGLE NUMBER	COORDINATES X1	COORDINATES Y1	COORDINATES Z1	・・・	COORDINATES X8	COORDINATES Y8	COORDINATES Z8
1	0.0	0.0	0.0		10.0	10.0	10.0
2	10.0	0.0	0.0		20.0	10.0	10.0
3							
4							
5							
・							
n							

FIG. 6A

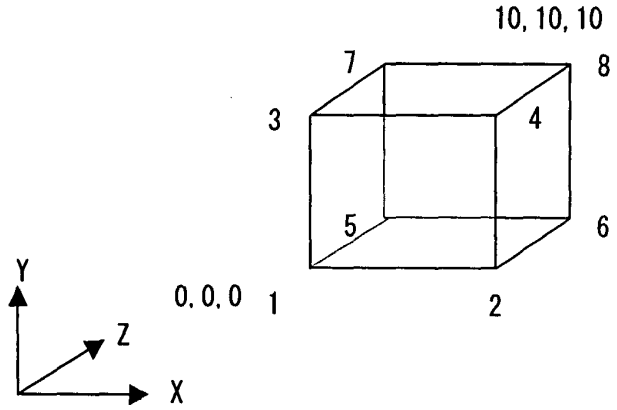


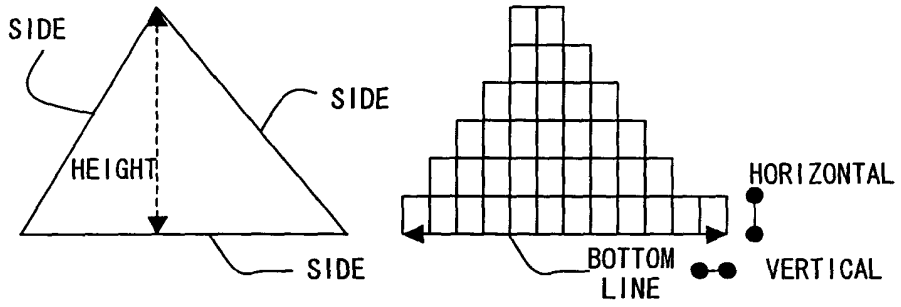
FIG. 6B

SURFACE AREA CALCULATION FACILITY UNIT 13

CALCULATION OF SURFACE AREA OF THREE-DIMENSIONAL CAD:
(BOTTOM SIDE × HEIGHT) + Σ (EACH SIDE × THICKNESS) ⇒ M

CALCULATION OF SURFACE AREA AFTER ASSIGNING GRID PATTERN:
Σ (VERTICAL LENGTH × HORIZONTAL LENGTH × 2) + Σ (VERTICAL LENGTH × THICKNESS) × 2 + Σ (THICKNESS × HORIZONTAL LENGTH) − OVERLAPPING SURFACE ⇒ N

SURFACE AREA ERROR = (M−N)/M ⇒ 0(%)
SURFACE AREA ERROR AMOUNT = (M × 0)/(VERTICAL LENGTH × HORIZONTAL LENGTH) ⇒ NUMBER OF PIECES



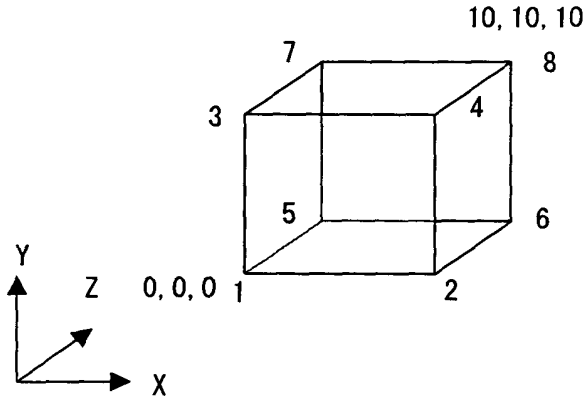


FIG. 7

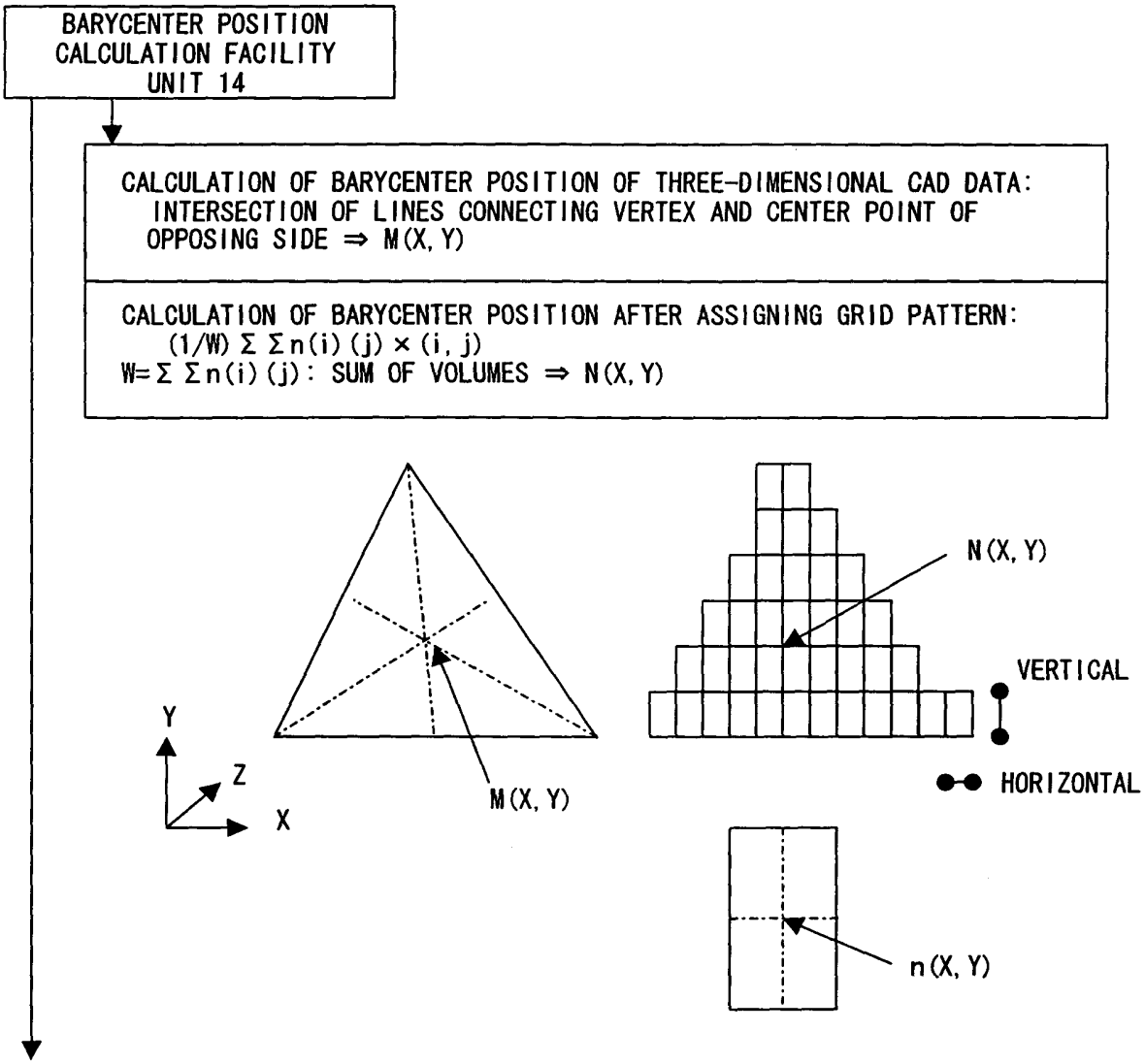

BARYCENTER POSITION CALCULATION FACILITY UNIT 14
CALCULATION OF BARYCENTER POSITION OF THREE-DIMENSIONAL CAD DATA: INTERSECTION OF LINES CONNECTING VERTEX AND CENTER POINT OF OPPOSING SIDE ⇒ M(X, Y)
CALCULATION OF BARYCENTER POSITION AFTER ASSIGNING GRID PATTERN: (1/W) Σ Σn(i)(j) × (i, j)
W=Σ Σn(i)(j): SUM OF VOLUMES ⇒ N(X, Y)
Y
Z
X
M(X, Y)
N(X, Y)
VERTICAL
HORIZONTAL
n(X, Y)

FIG. 8

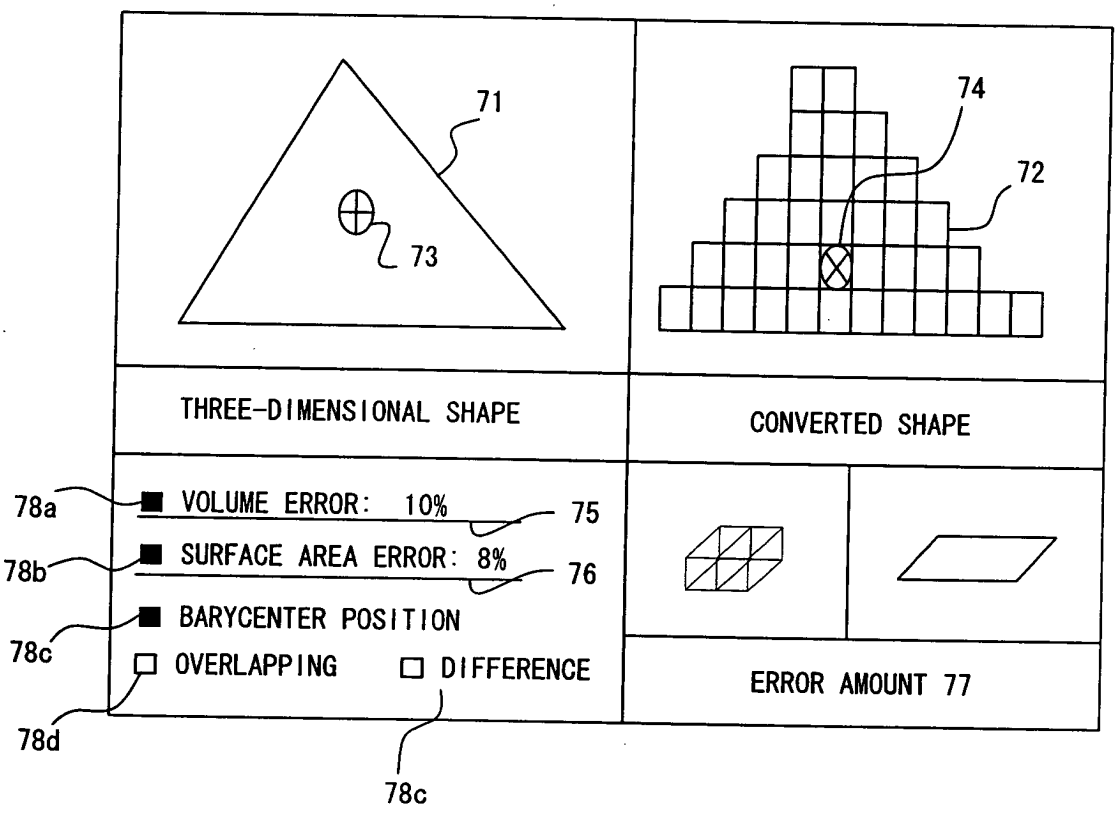

71
73
74
72
THREE-DIMENSIONAL SHAPE
CONVERTED SHAPE
78a
VOLUME ERROR: 10%
75
78b
SURFACE AREA ERROR: 8%
76
78c
BARYCENTER POSITION
78d
OVERLAPPING
DIFFERENCE
78c
ERROR AMOUNT 77

FIG. 9

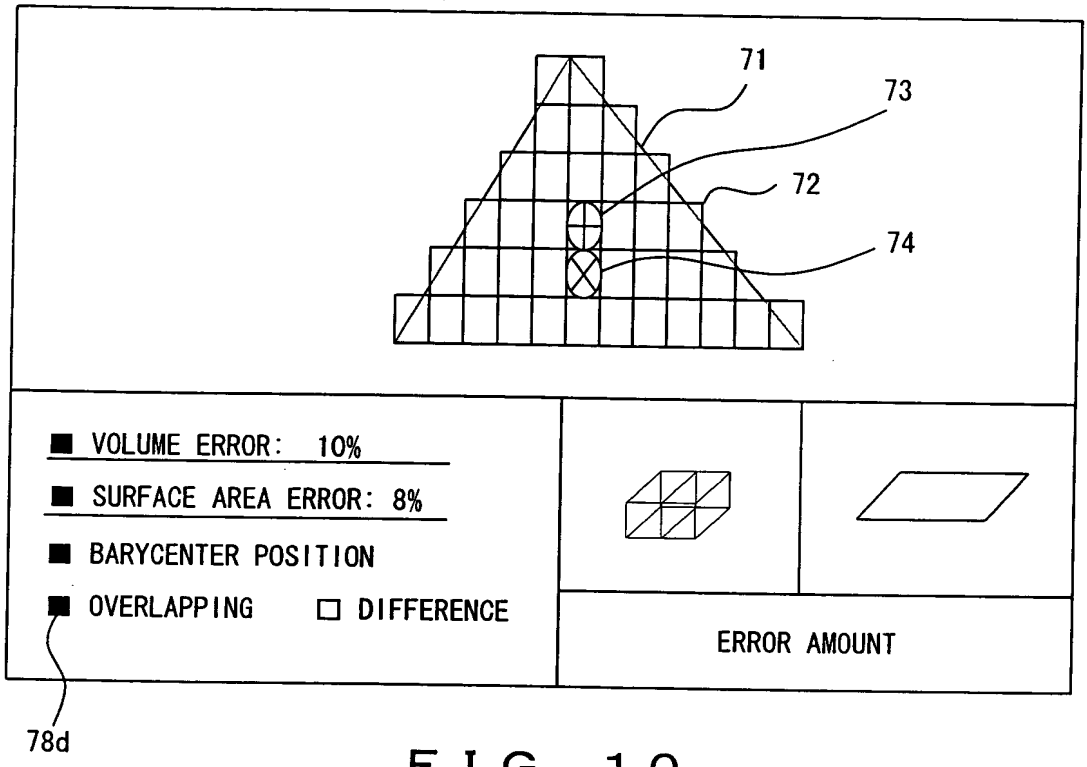

71
73
72
74
VOLUME ERROR: 10%
SURFACE AREA ERROR: 8%
BARYCENTER POSITION
OVERLAPPING
DIFFERENCE
ERROR AMOUNT
78d

FIG. 10

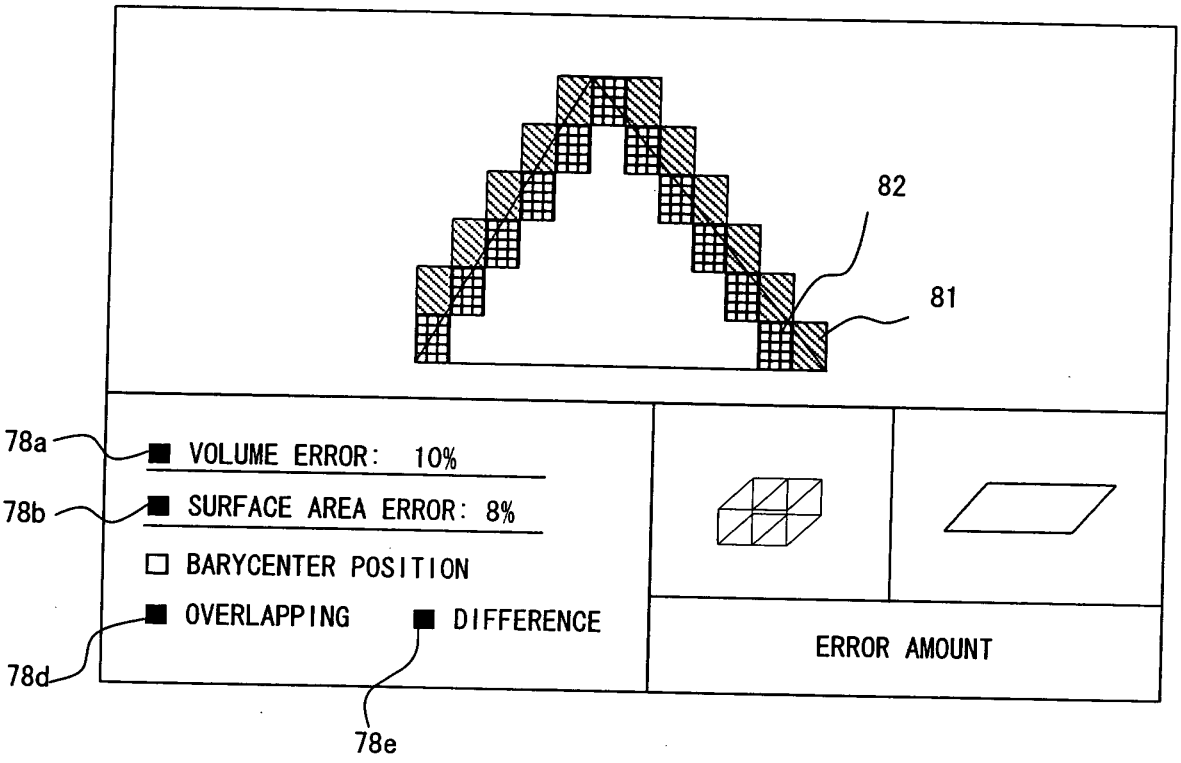

82
81
78a
VOLUME ERROR: 10%
78b
SURFACE AREA ERROR: 8%
BARYCENTER POSITION
OVERLAPPING
DIFFERENCE
78d
78e
ERROR AMOUNT

FIG. 11

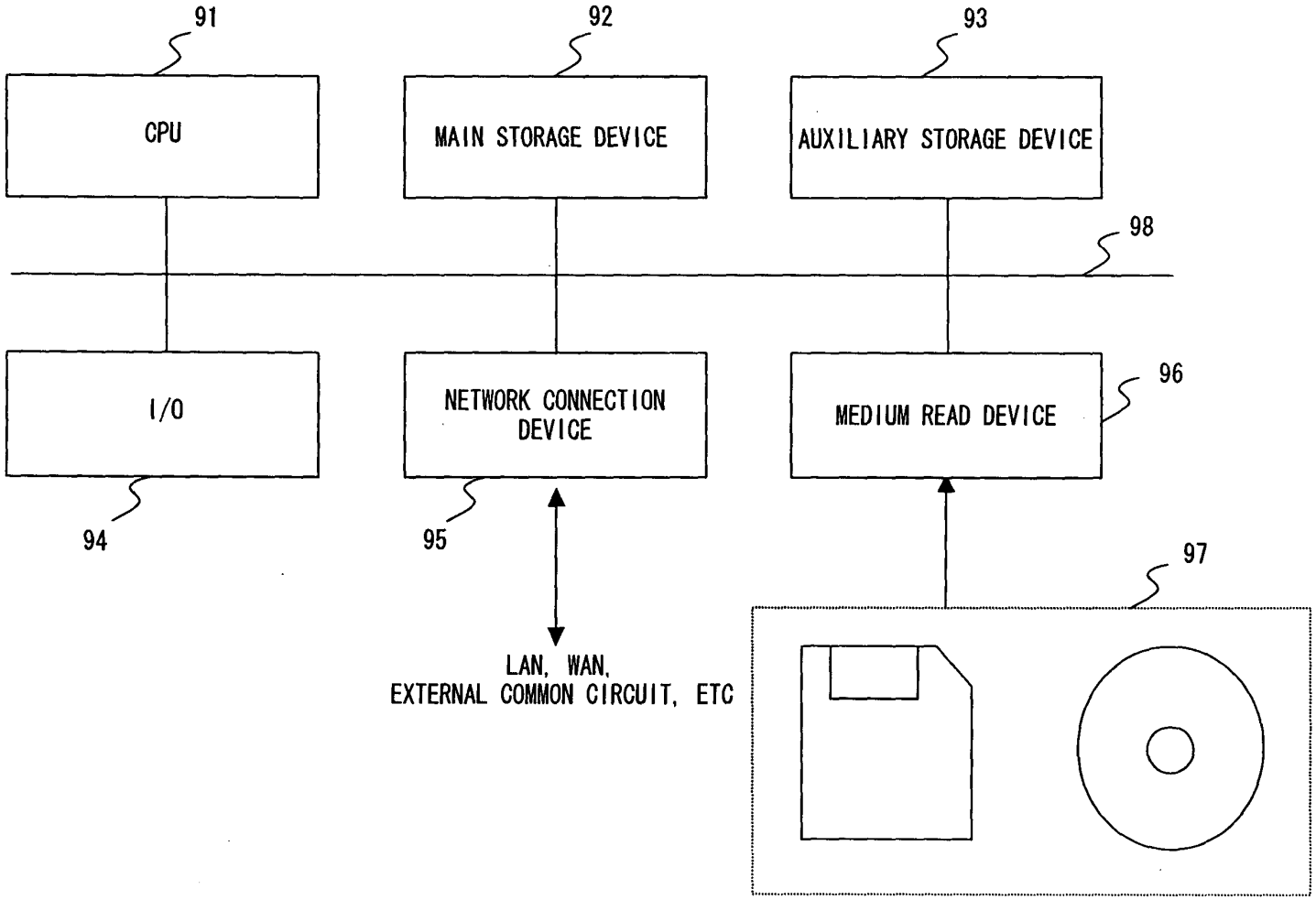

91
92
93
CPU
MAIN STORAGE DEVICE
AUXILIARY STORAGE DEVICE
98
I/O
NETWORK CONNECTION DEVICE
MEDIUM READ DEVICE
96
94
95
97
LAN, WAN,
EXTERNAL COMMON CIRCUIT, ETC

FIG. 12

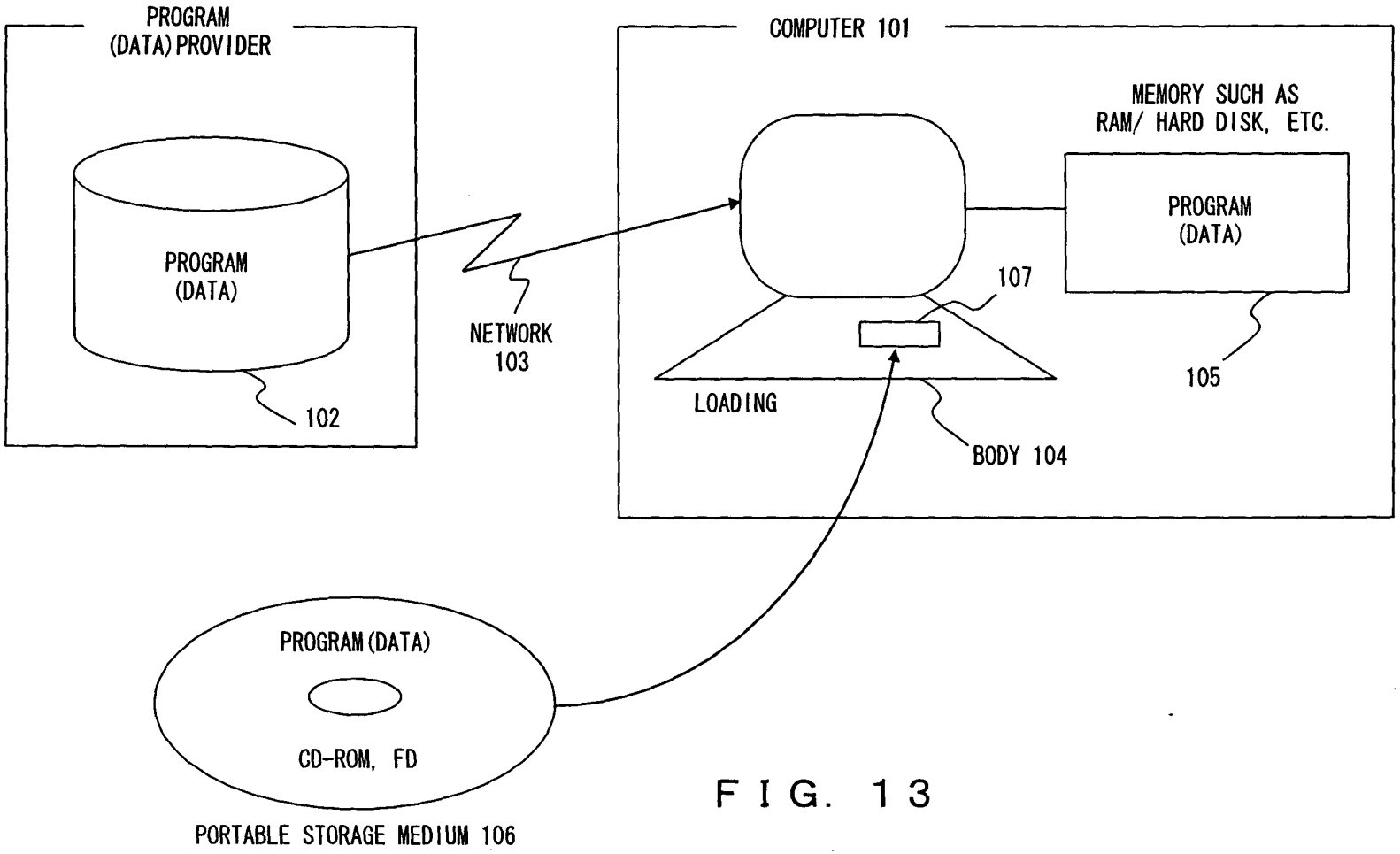

PROGRAM
(DATA) PROVIDER
PROGRAM
(DATA)
102
NETWORK
103
COMPUTER 101
MEMORY SUCH AS
RAM/ HARD DISK, ETC.
PROGRAM
(DATA)
105
107
LOADING
BODY 104
PROGRAM (DATA)
CD-ROM, FD
PORTABLE STORAGE MEDIUM 106

FIG. 13